TABLE OF CONTENTS – CARBON SCRUBBERS

ADSORPTION VESSELS

VAPOR and LIQUID PHASE SCRUBBER MEDIA ADSORPTION VESSELS

Spunstrand® Inc. manufactures a wide variety of FRP filament wound carbon media vapor phase scrubbers. The vessels range from passive venting up to 46,000 CFM within a single vessel. Spunstrand® Inc's. vessel configurations are Single Bed, Split Bed and Vertical Bed Systems both with and without blowers. Special configurations can be manufactured such as the skid mounted and recirculation systems.

Vapor Phase Odor / VOC / Corrosion Vessels

Canisters / Barrels Vessels
Venting to 200 CFM
Single Horizontal Bed Vessels
Venting to 3,500 CFM
Split Horizontal Bed Vessels
800 CFM to 16,500 CFM
Vertical Bed Systems Vessels
800 CFM to 46,000 CFM

MEDIA SELECTIONS and SPECIFICATIONS

Spunstrand® Inc. has available a number of common bituminous and coconut shell activated carbon medias in both virgin and impregnated forms. Spunstrand® Inc. also supplies additional carbon medias developed to meet specific municipal and industrial markets. The company also has available Potassium Permanganate impregnated aluminosilicate substrate (KMN) and Potassium Permanganate impregnated alumina.

Virgin and Impregnated Bituminous Coal Carbon
Virgin and Impregnated Coconut Shell Carbon
Potassium Permanganate Impregnated Aluminosilicate Substrate
Potassium Permanganate Impregnated Alumina

LIQUID PHASE MEDIA ADSORPTION VESSELS

Spunstrand® Inc. manufactures liquid phase FRP filament wound vessels in any configuration for municipal and industrial markets.

SD, PP and FV MATERIAL SERIES UNITS

Single Bed Single Pass Drum and Vessel Units

Spunstrand® Inc. manufactures a series of cost effective single bed units of various sizes and materials which can be utilized in applications where cost and simplicity are factors. These units are the most cost effective method whether used as a single or multiple units manifolded together.

The intake is on the side along the bottom with most size openings available. The outlet is mounted in the center of the removable top and can be connected to other ducting as required. The media bed is a horizontal bed unit and can be filled through the removable top with various types and amounts of media. An optional blower can be place remotely at either the inlet or outlet side of the media vessel to address space requirements. All unit shells are manufactured of FRP material unless otherwise noted.

MATERIAL	UNIT SIZE	FACE AREA	AIR VOLUME		MEDIA FT^3	MEDIA FT^3	STANDARD INLET / OUTLET SIZE
			50 FPM / 75 FPM		2 FT BED	3 FT BED	
SD, PP, FV	23” dia. x 44” *+	2.88 ft^2	145 cfm	216 cfm	5.75 ft^3	8.64 ft^3	2”
PP, FV	30” dia. x 40” *	4.90 ft^2	245 cfm	368 cfm	9.80 ft^3	14.7 ft^3	4”
PP, FV	48” dia. x 48” *	12.5 ft^2	625 cfm	938 cfm	25.0 ft^3	37.5 ft^3	6”
FV	60” dia. x 60”	19.6 ft^2	980 cfm	1,470 cfm	39.2 ft^3	58.8 ft^3	8”
FV	72” dia. x 72”	28.2 ft^2	1,410 cfm	2,115 cfm	56.4 ft^3	84.6 ft^3	10”
FV	96” dia. x 84” $$	50.2 ft^2	2,510 cfm	3,765 cfm	100.2 ft^3	150.3 ft^3	14”
FV	120” dia. x 96” $$	78.5 ft^2	3,925 cfm	5,887 cfm	157 ft^3	235.5 ft^3	18”
FV	144” dia. x 108” $$	113.0 ft^2	5,650 cfm	8,475 cfm	226 ft^3	339 ft^3	24”

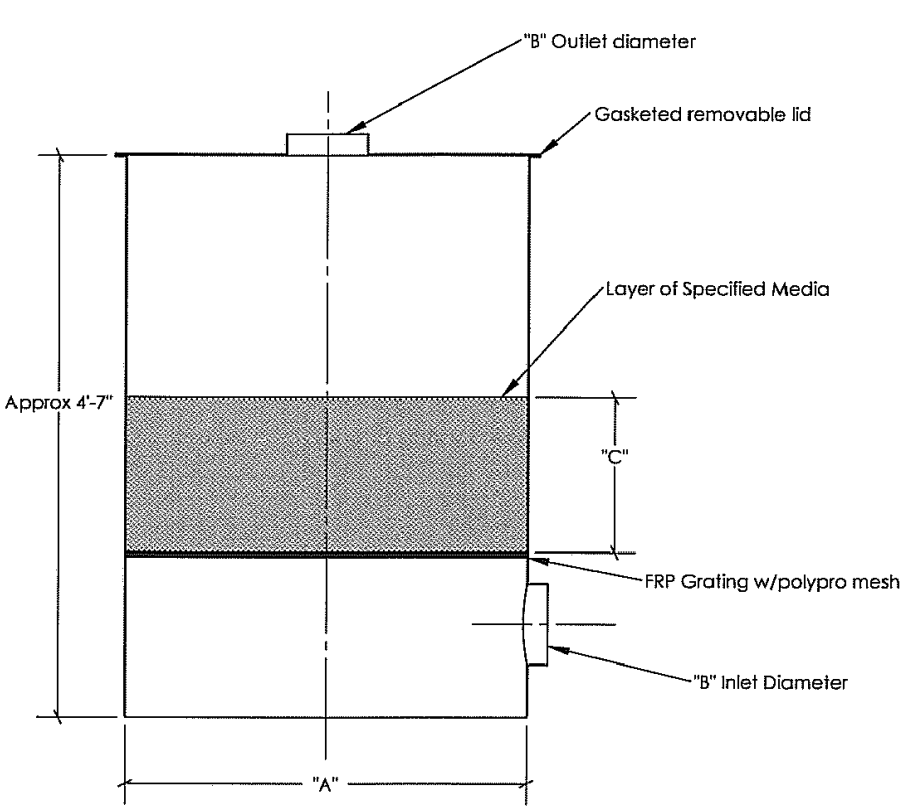
* NOTE: These size unit shells can be specified to be manufactured of polyethylene material for potential cost savings.

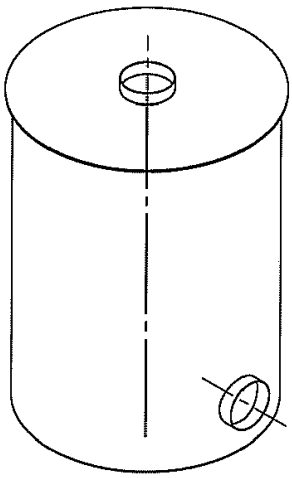
+ NOTE: This unit can be manufactured of painted steel (55 gallon barrel type).

$$ NOTE: These units have non-removable domed tops with 24” manways for media service.

OPTIONS: Different inlet / outlet sizes are available on each unit at an additional cost.

Please keep in mind that when increasing either the airflow or the media bed thickness, the static pressure through the media bed will increase. A means to offset increased static pressure is to enlarge the face area when possible.





Unit Std Diameter "A"	Std Inlet & Outlet "B"	Media Bed Depth "C"
24"	2"	12"-24" std
30"	4"	12"-24" std
36"	6"	12"-36" std
42"	6"	12"-36" std
48"	8"	12"-36" std
60"	8"	12"-36" std
72"	12"	12"-36" std

Notes:

1. Spunstrand container made of filament wound fiberglass per ASTM 2310.
2. Inlet & Outlet to accommodate customers current air flows.
3. 1' deep pack bed standard, up to 3 feet.
4. Gasketed removable lid for carbon exchange.
5. Different sizes and bed depths upon request.
6. Bottom drain optional.
7. Domed lids available, standard in 8', 10', and 12' diameters with 24" manways in place of removable top.

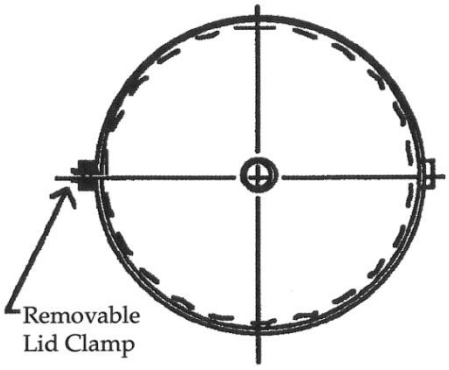
		DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ± ANGULAR: MACH ± BEND ± TWO PLACE DECIMAL ± THREE PLACE DECIMAL ±		NAME	DATE
			DRAWN	CJS	2009
			CHECKED		
			ENG APPR.		
			MFG APPR.		
		MATERIAL	Q.A.		
NEXT ASSY	USED ON	FINISH	COMMENTS:		
APPLICATION		DO NOT SCALE DRAWING			

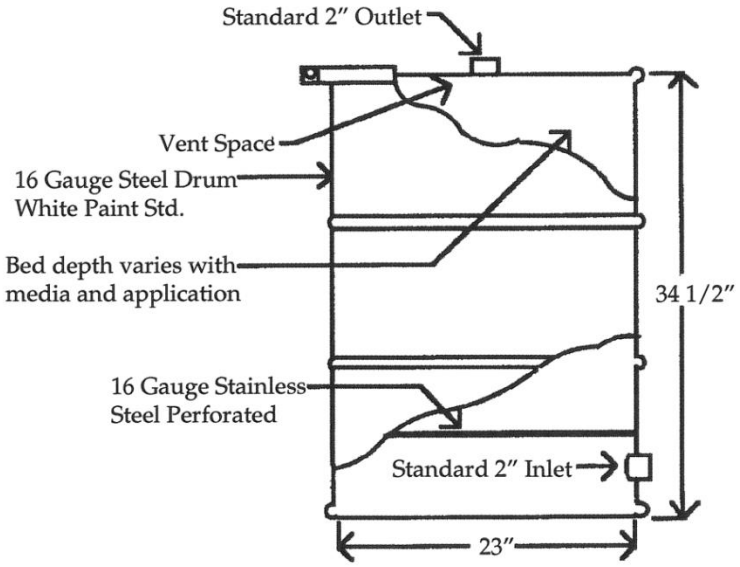
Spunstrand Inc.

Spunstrand®
F.V. Series Vent Drum

SIZE	DWG. NO.	REV.
A		

Spunstrand® S.D. Series Vent Drum





Scale NTS	Approved By	Drawn By E.E.
Date 2/27/95		Revised
Spunstrand Incorporated SD Series Vent Drum		
		Drawing Number SD Vent Drum

SINGLE BED SINGLE PASS TANK UNITS with BLOWER SKID MOUNTED

Spunstrand® Inc. manufactures a series of cost effective single bed units of various sizes and materials which can be utilized in applications where cost and simplicity are factors. These units are most cost effective when used as a single vessel with a combined blower all mounted on a single skid.

The intake normally is the blower and the gaseous air proceeds into the media vessel through the lower side. The outlet is mounted in the center of the removable top and can be connected to other ducting by a flex duct as required. The media bed is a horizontal bed unit and can be filled through the removable top or manway (on larger units), with various types and amounts of media. All media vessels are manufactured of FRP material unless otherwise noted.

NORMAL UNIT SKID SIZE W x H x L TYP.	FACE AREA	AIR VOLUME @ 65 FPM	MEDIA FT3 2 FT BED	MEDIA FT3 3 FT BED	MEDIA VESSEL SIZE	BLOWER HP / WHEEL SIZE 3.5" TYP.	STANDARD OUTLET
2' 4' 4'	2.88 ft²	185 cfm	5.75 ft³	8.64 ft³	23" dia. x 44" *+	.75/8"	4"
3.5' 4' 4.5'	4.90 ft²	315 cfm	9.80 ft³	14.7 ft³	30" dia. x 40" *	.75/9"	4"
4.5' 4' 5.6'	12.5 ft²	810 cfm	25.0 ft³	37.5 ft³	48" dia. x 48" *	1/12"	6"
5.5' 6' 7.5'	19.6 ft²	1,275 cfm	39.2 ft³	58.8 ft³	60" dia. x 60"	1.5/12.25"	6"
6.5' 6.5' 8.5'#	28.2 ft²	1,830 cfm	56.4 ft³	84.6 ft³	72" dia. x 72" #	3/14"	8"
8.5' 7.5' 10'#	50.2 ft²	3,260 cfm	100.2 ft³	150.3 ft³	96" dia. x 84" #	3/18.25"	12"

* NOTE: This size of the unit's shells can be specified to be manufactured of polyethylene material for potential cost savings.

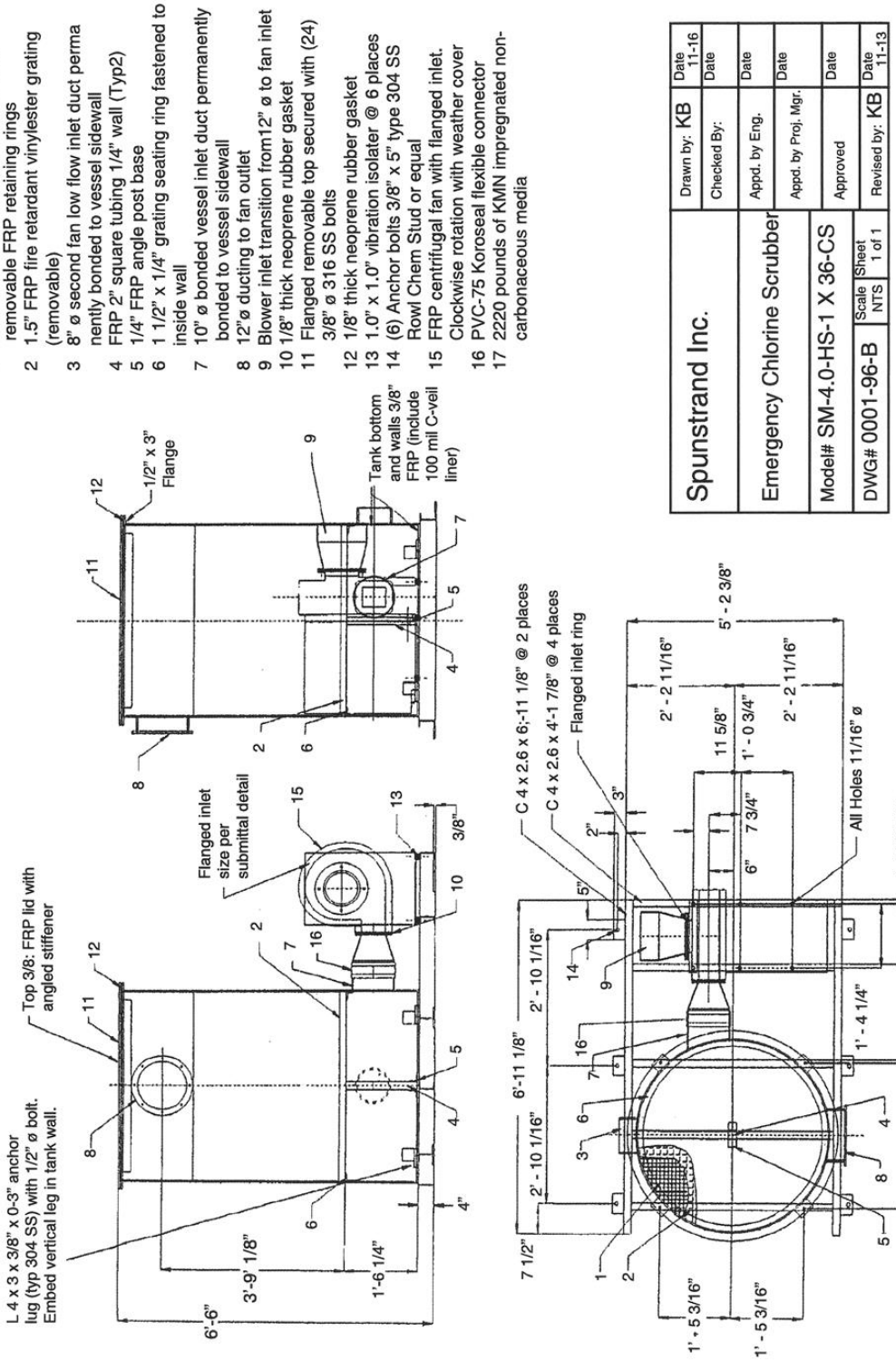
+ NOTE: This unit can be manufactured of Painted Steel (55 gallon barrel type).

NOTE: These units have a removable parcel lid cover for installation and removel of media in the lid of the unit.

The unit blower horse power and when diameter is intended to provide a typical application and most likely would be modified due to external conditions. We have provided you with the size motor and not the actual HP required. The blower and media vessel will be mounted on a single painted steel base.

OPTIONS: Different inlet / outlet sizes are available on each unit at an additional cost.

Single Bed, Single Pass Tank Unit with Blower, Skid Mounted



SPECIFICATION for FRP CARBON SCRUBBER VESSELS VERTICAL AIRFLOW, SINGLE HORIZONTAL BED FV SERIES DRUM STYLE OR SKID MOUNTED (TYPICAL)

2.01 GENERAL

A. FRP Reinforced Plastic Carbon Adsorption Scrubber Vessel, manufactured by Spunstrand® Inc. or pre-approved equal and shall be used to scrub foul and VOC laden air up to _____PPM continuous H_2S and other VOCs and identified environmental conditions as described in related specification sections.

2.02 **PERFORMANCE:** Activated carbon absorber systems shall be designed as follows:

Air Flow (cfm)	50-9,000 cfm
Facial Velocity (fpm)	50-75 fpm
Vessel Dimensions	12”∅-144"∅
Bed Type	Single
Media Depth	12”-36”

2.03 MATERIALS

A. FRP VESSEL

1. Type: Filament wound vessel rated at design pressures indicated in the drawings. Minimum wall thickness shall be _____”.
2. Grade: Type 1, Grade 2 RTRP vinylester, Class E per ASSTM D2310 and ASTM D3299.
3. The vessel shall be designed for not less than 21 inches water column pressure and 7 inches water column vacuum. Chop hoop or contact molded construction shall not be allowed.
4. A minimum structural safety factor of 5 to 1 shall be used in the design of vessel.
5. Maximum deflection of rectangular vessels under deadload and operating conditions shall not exceed 1% of the width of the longest side.
6. The Type A resin used shall be Hetron 922SB selected to meet the exposures and temperatures of the air to be exhausted. Fillers other than those added for flame retardance when required, shall **not** be allowed and should not exceed 5% by weight.
7. Corrosion liner: Inner surface shall contain a 10 mil thick minimum “C” veil saturated with vinylester resin. The surface veil shall be overlapped a minimum of 1” followed by two layers of 1.5 oz chopped strand mat. Total liner thickness shall be a minimum of 100 mils and consisting of approximately 70% resin and 30% glass content by weight.
8. Structural layer shall be filament wound Hetron 922SB premium grade vinylester resin and 250 yield strand roving as required for the specific working pressure, bedding conditions and design conditions. Glass content shall be 55% to 65% glass by weight.
9. Exterior of vessel shall contain sufficient resin to insure a relatively smooth surface from exposed glass fibers or sharp projections and shall contain an ultra violet inhibiting agent.
10. Standard lengths shall be in accordance with the manufacturer’s published product data sheets. Wall thickness of the vessel furnished shall not at any point be less than 87.5% of the nominal wall thickness specified when measured in accordance with ASTM D 3567 **Standard Method of Determining Dimensions of Reinforced Thermosetting Resin Pipe and Fittings.** Visual defects in accordance with ASTM D2563.

11. Vessel Stiffness: The vessel shall have sufficient strength to exhibit, without structural damage, a minimum pipe stiffness in accordance with ASTM D 2414 for the pipe laying conditions as noted for the design conditions.
12. Vessel manufactured with a composite structural wall containing siliceous sand or other granular fillers is **not** acceptable.

2.04 **ACCESSORIES**

A. **FITTINGS**

1. Flanged removable top shall be gasketed with 1/8" thick neoprene rubber. The cap shall be secured with 316 stainless steel hardware.
2. _____"∅ flanged outlet nozzle on removable top cap shall be complete with neoprene gasket and a blind flange.
3. _____"∅ fan inlet nozzle shall be permanently bonded into the vessel sidewall.
4. 1.5" FRP fire retandant vinylester grating shall be secured with either FRP I-beams or box beams permanently bonded to the inside of the vessel's structural layer. Beam size and quantity will depend on vessel diameter. After bonding the supports, the liner shall be restored to 100 mil minimum over the structural bonds.
5. 2" flanged drain nozzle flush with bottom cap shall be provided.
6. _____ cu. ft. of vapor phase carbon for (1) _____" deep bed per attached data sheet.
7. TETKO Polypro mesh 5-2000/51 with removable FRP retaining rings.
8. All hardware to be type 316 Stainless Steel.
9. Each vessel shall have a Spunstrand® Inc. media dip stick or (3) 1.5"∅ sample probes per bed which shall extend into the bed a minimum of twelve inches. The sample probes shall be blocked off with a ball valve constructed of PVC.
10. An optional stainless steel rod shall be provided to adequately ground each carbon bed.

B. **MEDIA**

1. The carbon media is to be _____ # _____- _____.
2. Media to be installed by contractor on site and provided by Spunstrand® Inc.

C. **VESSEL JOINTS:** Joints or attachments to the vessel shall use the same materials as the vessel and shall meet or exceed the hoop tensile and axial strength requirements of the vessel.

1. Flanges:
    a. Flanges shall be hand lay-up per NBS PS 1569.
    b. Flange gasket shall be full face neoprene gaskets, 1/8" minimum thickness.
2. Joints:
    a. Vessel joints shall be butt and wrap.
    b. Fittings shall be threaded, socket or flanged.
    c. Adhesive material for air service shall be suitable for 250°F continuous.

2 VERTICAL BED UNITS
1 PASS AIR FLOW (2X1)

The Spunstrand® Inc. FRP horizontal airflow split vertical media bed vessel system is one of the most efficient ODOR and VOC removal systems available. The design of the vessel provides easy external access for service of the media through the top of the unit. Eliminating entry into the vessel increases the safety of the personnel during the loading and unloading operation. These units can be placed above grade on saddles or buried in the ground with just the loading manways exposed. This provides an arrangement which allows for the placement of the blower, if needed, over the vessel reducing the combined footprint of the total system. The vertical bed design also provides uniform thickness of the media bed assuring no channeling in the media bed which could reduce efficiency and media life.

(2) 3.0' THICK BED SYSTEM – WITH 1 BED PER PASS					
UNITS	**LENGTH**	**FACE AREA**	**MEDIA FT^3**	**50 FPM**	**75 FPM**
3.5'dia. vbs	10 ft	19.2 sq ft	62.7 cu ft	960 cfm	1,440 cfm
4' dia. vbs	10 ft	25.3 sq ft	80.9 cu ft	1,256 cfm	1,885 cfm
5' dia. vbs	10 ft	39.2 sq ft	122.6 cu ft	1,960 cfm	2,940 cfm
6' dia. vbs	10 ft	56.5 sq ft	175.5 cu ft	2,827 cfm	4,241 cfm
7' dia. vbs	12 ft	76.9 sq ft	235.7 cu ft	3,845 cfm	5,767 cfm
8' dia. vbs	12 ft	100.5 sq ft	306.5 cu ft	5,026 cfm	7,539 cfm
10' dia. vbs	15 ft	157.1 sq ft	376.5 cu ft	7,854 cfm	11,781 cfm
12' dia. vbs	17 ft	226.2 sq ft	684.5 cu ft	11,309 cfm	16,963 cfm
14' dia. vbs	20 ft	307.8 sq ft	928.5 cu ft	15,393 cfm	23,089 cfm

NOTE: All of the above horizontal units are serviced from the top which allows these units to be buried. All sample and MASS TRANSFER ZONE monitoring access can be placed on top if vessel is buried; otherwise placement of these monitoring systems is normally on the side of the unit for easy use. The blower, prefilter and de-mister are external to these units but can be supplied as one complete package. The blower can be placed either in front of or behind the vessel as required. The manifold of both the intake and exhaust ducting is on the outside on either side of the vessel.

Standard Accessories:

- Top Loading and Unloading
- FRP Construction – Gelcoat Exterior
- Support Saddles
- Push-Through or Pull-Through Vessel Operation
- Interconnecting Manifold is External to the Vessel Thereby Increasing Media Area
- Assured Media Thickness. Reduces Irregularities of Horizontal Beds
- Increased Facial Area Reduced Velocity Thereby Reducing Length of MTZ.

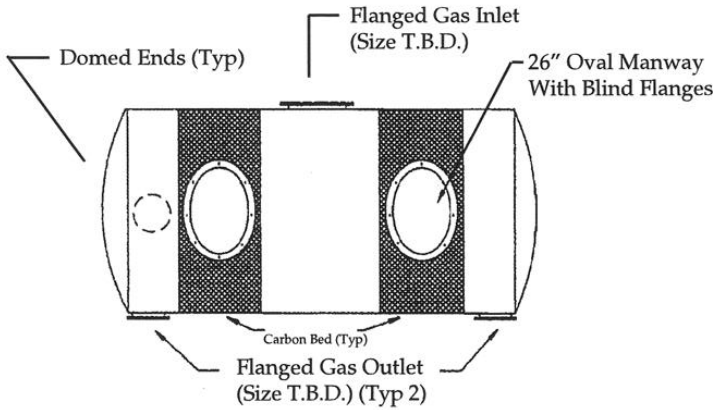
Options:

- Bury Vessel With Only The Top Exposed. Stack Blower On Top
- Dip Stick Mass Transfer Zone Measurement System
- Bottom Media Unloading Hoppers wth 4" Quick-Connect Connections. (Larger dia. only).
- External Sump Pump for Buried Units Only
- Insulation of Unit

Two Bed One Pass Vessel O.P.S. Form

Order entry form [ ] Pricing Request Form [ ] Submital Required Form [ ] Change/ Revision [ ] Rev. Date: / /

Order#_____ Job#_____ Quote#_____



This unit is utilized when large airflow is required.
The increased face area allows lower velocity.

Fitting Schedule			
Item	Size	Cty	Description
Item	Bed Depth		Media Type

Notes:
1
2
3
4

Site Requirements:
Above Ground_____
Saddles_____
Partial Burial_____
Complete to Burial_____
Curb Requirements____
Duct Manifold_____
Total CFM Design_____
Static Pressure_____

		Y	N	
Specifications Attached				
Drawings or Cutsheets				
Take-off list of materials				
Liners	C-Veil			Thickness
	Syn-Veil			Thickness
	1.5 oz Mat			# Layers
	Resin Type			
	Antimony			%
	Total Liner Thickness			
	Post Cure			
Structural Layers	Filament Wound			Thickness
	Helix Angle: Std			
	Helix Angle: Spec.			Degrees +/-
	Woven Roving			# Layers
	Alternate Layers 1.5 oz Mat			# Layers
	Resin Type			
	Antimony			%
	Insulation R Value			
	Structural Thickness			
	*Structural Calcs. Req'd			
Exterior Surface	Plain Wound Surf.			Thickness
	Class 1 Paint			Color
	Gelcoat			Mfr. #
	C-Veil			# Layers
				mils.

* Send copy to Design Team Member(s)

Scale: NTS	Approval:	Drawn By:
Date:		Revised:
Spunstrand Incorporated Horizontal Airflow Vertical Bed Carbon Scrubber		
	Part No.:	

SPECIFICATION for HORIZONTAL AIRFLOW VERTICAL BED CARBON SCRUBBER 2 VERTICAL BEDS, SINGLE PASS (2x1) (TYPICAL)

PRODUCTS

2.01 GENERAL

A. Fiberglass reinforced plastic horizontal airflow split vertical bed scrubber as manufactured by Spunstrand® Inc. or pre-approved equal and shall be used to scrub foul and VOC laden air up to _____ PPM continuous H^2S and other VOCs and identified environmental conditions as described in related specification sections.

2.02 **PERFORMANCE:** Activated carbon absorber systems shall be designed as follows:

Air Flow (cfm)	800-23,000 cfm
Facial Velocity (fpm)	50-75 fpm
Vessel Dimensions	12”∅-168"∅
Bed Type	Single
Media Depth	18”-36”

2.03 MATERIALS:

A. FRP Vessel

1. Type: Filament wound rated at design pressures indicated in the drawings. Minimum wall thickness shall be _____ including the liner.
2. Grade: Type 1, Grade 2 RTRP, Class E per ASTM D2310 and D2996.
3. Vessel shall be designed for not less than 20 inches water column pressure and 12 inches water column vacuum. The design, applicable construction and inspections shall be in accordance with NBS PS 15-69.
4. A minimum structural safety factor of 5 shall be used in the design of the vessel.
5. The resin used shall be Hetron 992SB selected to meet the exposures and temperatures of the air to be exhausted. Fillers other than antimony trioxide added for flame retardane when required shall **not** be allowed and should not exceed 5% by weight. A thixotropic agent for viscosity control may be used as recommended by the resin manufacturer. No thixotropic agent is to be used in the corrosion liner or on surfaces to be in contact with the corrosive environment. Flame spread rating shall be 25 or less per ASTM E-84. Catalyst shall be DDM9 or High Point 90 as recommended by Ashland Chemical.
6. Corrosion Liner: Inner surface shall contain one (1) ply of a 10 mil thick minimum C-glass surfacing veil saturated with vinylester resin. The surface veil shall be overlapped a minimum of 1”. Surface veil layers shall be followed by two (2) layers of 1-1/2 oz / sq ft chopped strand mat. Corrosion liner is to gel completely before proceeding with structural laminates. In no case shall the interruption exceed 12 hours. Total liner thickness to be 100 mils. No thixotropic agent or fire retardant additive is to be used in the liner resin. Corrosion liner shall contain not less than 20% or more than 30% glass by weight. The liner shall pass inspection for ASME RTP-1 Table 6-1 visual acceptance criteria.
7. Structural layer shall be filament wound of Hetron 992SB premium vinylester resin and Type E 250 strand yield continuous glass roving. The band width is 2 ¼” using seven (7) strands per inch. Filament winding cycle thickness to be 0.06” maximum. Glass content shall be 55 to 65%. Winding angle shall be 55° to 70°± 3°. Chopped hoop winding and hand lay-up will not be allowed in the structural layers.

8. Exterior of all laminates shall contain sufficient resin to ensure a relatively smooth surface free from exposed glass fibers or sharp projections. Scrubber vessels located outdoors shall contain an exterior colored surface coat with an untraviolet stabilizer added to the final coat that also incorporates parfinated wax curing elements. Color selected by owner.
9. Vessels two (2) beds shall be vertical and _____" minimum widths. Beds shall be secured with minimum 1.5" thick vinylester grating and either FRP I-beams or box beams permanently bonded to the inside of the vessels. After bonding the supports, the liner shall be restored to 100 mils minimum over the structural bonds. The beds shall have top access manways for filling and replacing the scrubber media. TETKO Polypro mesh 5-2000 / 51 shall be used to contain the media and secured 360° to the grating. The manways shall be _____"∅ 150 lb. flange and blind flange complete with EPDM gasket and SS hardware.
10. The scrubber inlet and outlets shall be flanged as shown on the drawings.
11. Domed ends shall be factory attached and constructed to the same liner and structural wall thickness. Chopper gun or hand-lay-up method are acceptable so long as there is no antimony added to the 100 mil liner.
12. Vessel shall be equipped with a 12"∅ FRP sump with a ¾" drain and ball valve (Optional: when buried below ground level w/sump pump connected to pipe) to be connected to a P-trap supplied by others (utilized in wastewater applications).
13. Vessel will have inserted in each media bed a grounding rod which will have an external means to connect a grounding strap.

2.04 **ACCESSORIES**

A. Media
   1. The media in the vessel is to be _____ # _____ - _____ .
   2. Media specs refer to spec section for media.

B. Media Installation
   1. Media to be installed by contractor on site.
   2. Supplied by scrubber manufacturer.

C. FRP Duct Manifold and Stack: (See page 20)
   1. FRP duct and stack will be supplied by the carbon vessel supplier per specifications.
   2. PVC flex connector with flanges will be supplied to connect fan to vessel.
   3. Fan will also be supplied as part of a complete scrubber package with the Vessel supplier being responsible for the successful supply and start-up of the system. A minimum of 2 days will be required by the vessel supplier at start-up to ensure proper installation and operation. (Fan Specifications will be included based on application).

4. FRP vessel with internal support system and epoxy coated steel base saddles will be provided by vessel manufacturer and shall be checked and stamped by a Structural Engineer to meet structural requirements and seismic requirements. Grating and mesh must be removable/replaceable with no change or compromise to the structural design. Buried vessels shall have calcs showing design compliance **without** the grating bulkheads. (Optional) A Media Life Sampling Probe which allows the external viewing of the remaining life of the carbon media shall be included in each carbon bed.

2.05 **QUALITY ASSURANCE**

A. Pre-bid approval for filament wound FRP scrubbers and related interconnecting materials will be required for all manufacturers listed in the specification. Pre-bid approval will be based on receiving the following acceptable samples and data a minimum of (7) days prior to bid date:

1. (2) sample cutouts demonstrating 60 to 110 mil clear liner with no antimony and filament wound structural laminate. Samples to be a minimum of 8"∅ and shall demonstrate RTP-1 visual level II.
2. Company filament winding history and at least (2) FRP carbon scrubber job names with similar type construction, contacts and phone numbers for reference.
3. At least one stamped set of calculations from a previous vessel installation.
4. A copy of the fabricator's complete quality manual.

B. All FRP Vessels shall be fabricated and installed by qualified, experienced mechanics who have a minimum of 3 years experience with the lay-up, fabrication and installation of this type of system.

C. Factory Inspection:

1. Owner shall be given access to the FRP Vessel and all quality control records during fabrication and upon completion for the purpose of verifying compliance to the Contract Documents.
1. The owner shall maintain the right to tour the FRP vessel manufacturer's plant anytime that fabrication is in process prior to final shipment. The owner and engineer may exercise the option, without any advance notice, to tour the plant and inspect all stages of fabrication to ensure that quality control is being maintained.
2. Inspection by owner does not relieve any responsibility of the fabricator to meet the requirements of this specification.
3. Final Inspection: The engineer and owner may carry out a final inspection of the equipment prior to shipment. Fabricator shall give the owner a minimum of 5 days advance notice of scheduled shipment. Prior to final inspection by owner the vessel shall be cleaned of all foreign material and shall be in a position that allows easy access and viewing.

D. Acceptance:

1. Lack of compliance with any aspect of the specifications and drawings will be grounds for rejection of the equipment.
2. Repair of rejected equipment - repair procedures must be approved by the owner prior to implementation. No more than 5% of the surface area of each FRP vessel component may be repaired.

E. The fabricator's inspector (Quality Control Manager) will provide the owner with a complete Quality Control report for the job. The report will be available within 15 days after the final parts are complete. The final report will include the QC sheets on all parts manufactured making it impractical to send prior to the final shipment of a job that will span several months. The fabricator will have available after each shipment the completed QC sheets for review upon request at anytime.

F. The fabricator shall submit a sample of a vessel cutout at least 8" in diameter to demonstrate specification compliance and the ability to produce and maintain ASME RTP-1 Table 6-1 visual acceptance criteria. A plant and fabrication method inspection by an outside testing agency may be required prior to fabrication, or a letter from FSE confirming a satisfactory inspection in the last 6 months. A failed inspection and any subsequent re-inspection will also be at the fabricators expense.

2.06 **SUBMITTALS**

A. Provide the following information in addition to the standard submittal requirements with the Bid:

4. The fabricator shall submit for approval all reference standards, calculations. fabrication drawings and all engineering details of the vessel design prior to beginning fabrication.
    a. The submittal should include all information utilized by the fabricator which describes specifically how their FRP vessels are manufactured. This should be in the form of shop drawings, standards, specifications, other shop instructions and QC records. This should include, but not be limited to:
        1. Resin type
        2. Types and amount of filler
        3. Corrosion liner description
        4. Reinforcement types for hand lay-up or chopped laminates
        5. For filament-wound laminates
            a. Helix angle
            b. Glass content range
            c. Strand yield
            d. Strand by inch in the winding band
            e. Ply thickness
            f. Amount of chop or unidirectional roving interspersed with winding, if any, and location within laminate
        6. For all fabricated parts
            a. Construction type
            b. Laminate thickness
            c. Ply sequences
            d. Glass content range
        7. For all secondary overlays (both interior and exterior):
            a. Laminate thickness
            b. Ply sequences and widths
        8. Construction details for all other special configurations and fabricated parts.

B. FRP vessel cutout a minimum of 8” in diameter and of the quality of workmanship and glass / resin being quoted. These will be retained for quality comparison on materials shipped to jobsite.

C. Recommended procedure for the protection and handling of materials prior to installation.

D. Quality control manual detailing shop QC inspection procedures and documentation and samples of all shop QC forms utilized in the process.

4 VERTICAL BED UNITS
1 PASS AIR FLOW (4x1)

The Spunstrand® Inc. FRP horizontal airflow split vertical media bed vessel system is one of the most efficient ODOR and VOC removal systems available. The design of the vessel provides easy external access for service of the media through the top of the unit. Eliminating entry into the vessel increases the safety of the personnel during the loading and unloading operation. These units can be placed above grade on saddles or burried in the ground with just the loading manways exposed. This provides an arrangement which allows for the placement of the blower, if needed, over the vessel reducing the combined footprint of the total system. The vertical bed design also provides uniform thickness of the media bed assuring no channeling in the media bed which could reduce efficiency and media life.

(4) 3.0' THICK BED SYSTEM – WITH 1 BED PER PASS					
UNITS	**LENGTH**	**T. FACE AREA**	**TOTAL MEDIA FT³**	**50 FPM**	**75 FPM**
3.5' dia. vbs	18.5 ft	38.5 sq ft	120.5 cu ft	1,925 cfm	2,887 cfm
4' dia. vbs	19.1 ft	50.6 sq ft	155.8 cu ft	2,530 cfm	3,795 cfm
5' dia. vbs	20.0 ft	78.5 sq ft	240.5 cu ft	3,925 cfm	5,887 cfm
6' dia. vbs	22.2 ft	113.1 sq ft	344.5 cu ft	5,654cfm	8,481 cfm
7' dia. vbs	23.5 ft	153.9 sq ft	466.5 cu ft	7,695 cfm	11,542 cfm
8' dia. vbs	25.0 ft	201.1 sq ft	608.5 cu ft	10,052 cfm	15,078 cfm
10' dia. vbs	27.5 ft	314.2 sq ft	947.5 cu ft	15,708 cfm	23,562 cfm
12' dia. vbs	29.7 ft	452.4 sq ft	1,362.5 cu ft	22,618 cfm	33,927 cfm
14' dia. vbs	31.0 ft	615.6 sq ft	1,851.8 cu ft	30,786 cfm	46,179 cfm

NOTE: All of the above horizontal units are serviced from the top which allows these units to be buried. All sample and MASS TRANSFER ZONE monitoring access can be placed on top if vessel is buried, otherwise placement of these monitoring systems is normally on the side of the unit for easy use. The blower, pre-filter and de-mister are external from these units but can be supplied as one complete package. The blower can be placed either in front or behind the vessel as required. The manifold of both the intake and exhaust ducting is on the outside on either side of the vessel.

Standard Accessories:

- Top Loading and Unloading
- FRP Construction – Gelcoat Exterior
- Support Saddles
- Pressure or Vacuum Vessel
- Interconnecting Manifold is External of the Vessel thereby Increasing Media Area
- Assured Media Bed Thickness. Reduces Irregularities of Horizontal Beds
- Increased Facial Area Reduced Velocity thereby Reducing Length of MTZ

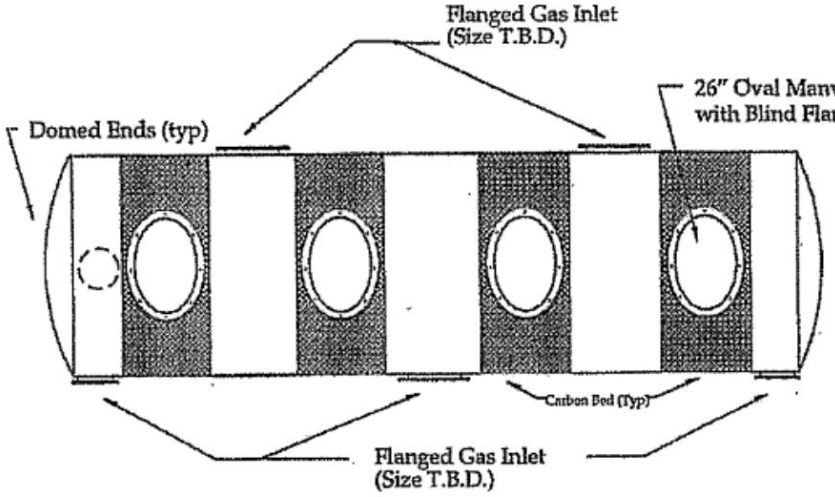
Options:

- Bury Vessel w / Top Only Exposed with Blower on Top
- Dipstick Mass Transfer Zone Measurement System
- Bottom Media Unloading Hoppers with 4" Quick-Connect-Connections (Larger dia. only)
- Water Sump for Pump-Out with Remote Pump (Buried Units Only)
- Insulation of Unit

Four Bed One Pass Vessel O.P.S. Form

Order entry form [ ] Pricing Request Form [ ] Submital Required Form [ ] Change/ Revision [ ] Rev. Date: / /

Order#_____ Job#_____ Quote#_____



This unit is utilized when large airflow is required.
The increased face area allows lower velocity.

Fitting Schedule			
Item	Size	Cty	Description
Item	Bed Depth		Media Type

Notes:
1
2
3
4

Site Requirements:
Above Ground_____
Saddles_____
Partial Burial_____
Complete to Burial_____
Curb Requirements_____
Duct Manifold_____
Total CFM Design_____
Static Pressure_____

		Y	N	
Specifications Attached				
Drawings or Cutsheets				
Take-off list of materials				
Liners	C-Veil			Thickness
	Syn-Veil			Thickness
	1.5 oz Mat			# Layers
	Resin Type			
	Antimony			%
	Total Liner Thickness			
	Post Cure			
Structural Layers	Filament Wound			Thickness
	Helix Angle: Std			
	Helix Angle: Spec.			Degrees +/-
	Woven Roving			# Layers
	Alternate Layers 1.5 oz Mat			# Layers
	Resin Type			
	Antimony			%
	Insulation R Value			
	Structural Thickness			
	*Structural Calcs. Req'd			
Exterior Surface	Plain Wound Surf.			Thickness
	Class 1 Paint			Color
	Gelcoat			Mfr. #
	C-Veil			# Layers
				mils.

* Send copy to Design Team Member(s)

Scale: NTS	Approval:	Drawn By:
Date:		Revised:
Spunstrand Incorporated Horizontal Airflow Vertical Bed Carbon Scrubber		
	Part No.:	

4 VERTICAL BED UNITS
2 PASS AIR FLOW (4x2)

The Spunstrand® Inc. FRP horizontal airflow split vertical media bed vessel system is one of the most efficient ODOR and VOC removal systems available. The design of the vessel provides easy external access for service of the media through the top of the unit. Eliminating entry into the vessel increases the safety of the personnel during the loading and unloading operation. These units can be placed above grade on saddles or burried in the ground with just the loading manways exposed. This provides an arrangement which allows for the placement of the blower, if needed, over the vessel reducing the combined footprint of the total system. The vertical bed design also provides uniform thickness of the media bed assuring no channeling in the media bed which could reduce efficiency and media life.

(4) 1.5' THICK BED SYSTEM – WITH 2 BED PER PASS					
UNITS	**LENGTH**	**FACE AREA**	**MEDIA FT^3**	**50 FPM**	**75 FPM**
3.5'dia. vbs	10 ft	19.2 sq ft	61.6 cu ft	960 cfm	1,440 cfm
4' dia. vbs	10 ft	25.3 sq ft	80.2 cu ft	1,256 cfm	1,885 cfm
5' dia. vbs	10 ft	39.2 sq ft	122.0 cu ft	1,960 cfm	2,940 cfm
6' dia. vbs	12 ft	56.5 sq ft	173.6 cu ft	2,827cfm	4,241 cfm
7' dia. vbs	12 ft	76.9 sq ft	235.0 cu ft	3,845 cfm	5,767 cfm
8' dia. vbs	12 ft	100.5 sq ft	305.6 cu ft	5,026 cfm	7,539 cfm
10' dia. vbs	15 ft	157.1 sq ft	475.4 cu ft	7,854 cfm	11,781 cfm
12' dia. vbs	20 ft	226.2 sq ft	683.0 cu ft	11,309 cfm	16,963 cfm
14' dia. vbs	22 ft	307.8 sq ft	927.6 cu ft	15,393 cfm	23,089 cfm

NOTE: All of the above horizontal units are serviced from the top which allows these units to be buried. All sample and MASS TRANSFER ZONE monitoring access can be placed on top if vessel is burried, otherwise placement of these monitoring systems is normally on the side of the unit for easy use. The blower, pre-filter and de-mister are external from these units but can be supplied as one complete package. The blower can be placed either in front or behind the vessel as required. The monifold of both the intake and exhaust ducting is on the outside on either side of the vessel.

Standard Accessories:

- Top Loading and Unloading
- FRP Construction – Gelcoat Exterior
- Support Saddles
- Pressure or Vacuum Vessel
- Interconnecting Manifold is External of the Vessel thereby Increasing Media Area
- Assured Media Thickness. Reduces Irregulars of Horizontal Beds
- Increased Facial Area Reduced Velocity thereby Reducing Length of MTZ

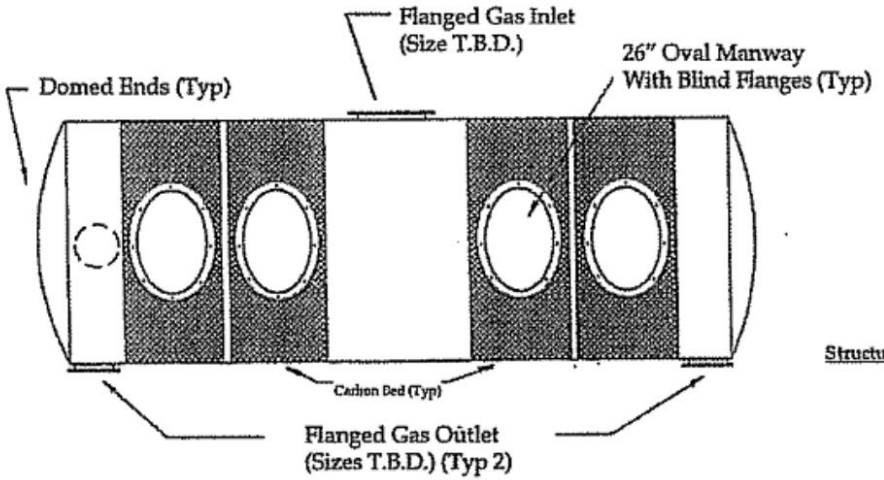
Options:

- Bury Vessel with Only the Top Exposed. Stack Blower on Top
- Dipstick Mass Transfer Zone Measurment System
- Addition of Second Pass of Media for Separate VOC Removal
- Bottom Media Unloading Hoppers with 4" Quick-Connect Connections (Larger dia. Only)
- External Sump Pump for Buried Units Only
- Insulation of Unit

Four Bed Two Pass Vessel O.P.S. Form

Order entry form [ ] Pricing Request Form [ ] Submital Required Form [ ] Change/ Revision [ ] Rev. Date: / /

Order#_____ Job#_____ Quote#_____



This unit is utilized when large airflow is required. The increased face area allows lower velocity. Vessel provides multiple passes.

		Y	N	
Specifications Attached				
Drawings or Cutsheets				
Take-off list of materials				
Liners	C-Veil			Thickness
	Syn-Veil			Thickness
	1.5 oz Mat			# Layers
	Resin Type			
	Antimony			%
	Total Liner Thickness			
	Post Cure			
Structural Layers	Filament Wound			Thickness
	Helix Angle: Std			
	Helix Angle: Spec.			Degrees +/-
	Woven Roving			# Layers
	Alternate Layers 1.5 oz Mat			# Layers
	Resin Type			
	Antimony			%
	Insulation R Value			
	Structural Thickness			
	*Structural Calcs. Req'd			
Exterior Surface	Plain Wound Surf.			Thickness
	Class 1 Paint			Color
	Gelcoat			Mfr. #
	C-Veil			# Layers
				mils.

* Send copy to Design Team Member(s)

Fitting Schedule			
Item	Size	Cty	Description
Item	Bed Depth		Media Type

Notes:
1
2
3
4

Site Requirements:
Above Ground_____
Saddles_____
Partial Burial_____
Complete to Burial_____
Curb Requirements_____
Duct Manifold_____
Total CFM Design_____
Static Pressure_____

Scale: NTS	Approval:	Drawn By:
Date:		Revised:
Spunstrand Incorporated Horizontal Airflow Vertical Bed Carbon Scrubber		
	Part No.:	

SPECIFICATION FOR SPUNSTRAND® INC. HORIZONTAL AIRFLOW VERTICAL BED CARBON SCRUBBER
4 VERTICAL BEDS
(Typical 4x1 & 4x2)

Products

2.01 **GENERAL**

A. Fiberglass reinforced plastic horizontal airflow split vertical bed scrubber vessel as manufactured by Spunstrand® Inc. or pre-approved equal and shall be used to scrub foul and VOC laden air up to _____ PPM continuous H^2S, and other VOCs and identified environmental conditions as described in related specification sections.

2.02 **PERFORMANCE:** Activated carbon absorber systems shall be designed as follows:

Air Flow (cfm)	800-46,000 cfm
Facial Velocity (fpm)	50-75 fpm
Vessel Dimensions	12"∅-168"∅
Bed Type	Single or Double
Media Depth	18"-36"

2.03 **MATERIALS**

A. FRP Vessel

1. Type: Filament wound rated at design pressures indicated in the drawings. Minimum wall thickness shall be _____ including the liner.
2. Grade: Type 1, Grade 2 RTRP, Class E per ASTM D2310 and D2996.
3. Vessel shall be designed for not less than 20 inches water column pressure and 12 inches water column vacuum. The design, applicable construction and inspections shall be in accordance with NBS PS 15-69.
4. A minimum structural safety factor of 5 shall be used in the design of the Vessel.
5. The resin used shall be Hetron 992SB selected to meet the exposures and temperatures of the air to be exhausted. Fillers other than antimony trioxide added for flame retardance when required, shall **not** be allowed and should not exceed 5% by weight. A thixotropic agent for viscosity control may be used as recommended by the resin manufacturer. No thixotropic agent is to be used in the corrosion liner or on surfaces to be in contact with the corrosive environment. Flame spread rating shall be 25 or less per ASTM E-84. Catalyst shall be DDM9 or High Point 90 as recommended by Ashland Chemical.
6. Corrosion Liner: Inner surface shall contain one (1) ply of a 10 mil thick minimum C-glass surfacing veil saturated with vinylester resin. The surface veil shall be overlapped a minimum of 1". Surface veil layers shall be followed by two (2) layers of 1-1/2 oz. / sq ft chopped strand mat. Corrosion liner is to gel completely before proceeding with structural laminates. In no case shall the interruption exceed 12 hours. Total liner thickness to be 100 mils. No thixotropic agent or fire retardant additive is to be used in the liner resin. Corrosion liner shall contain no less than 20% nor more than 30% glass by weight. The liner shall pass inspection for ASME RTP-1 Table 6-1 visual acceptance criteria.
7. Structural layer shall be filament wound of Hetron 992SB premium grade vinylester resin and Type E 250 strand yield continuous glass roving. The band width is 2 1/4" using (7) strands per inch. Filament winding cycle thickness to be 0.06" maximum. Glass content shall be 55 to 65%. Winding angle shall be 55° to 70° ± 3°. Chopped hoop winding and hand lay-up will not be allowed in the structural layers.

8. Exterior of all laminates shall contain sufficient resin to ensure a relatively smooth surface free from exposed glass fibers or sharp projections. Scrubber vessels located outdoors shall contain an exterior colored surface coat with an ultraviolet stabilizer added to the final coat that also incorporates paraffinated wax curing elements. Color to be selected by owner from Spunstrand® Inc. color chart.
9. Vessel beds (4) shall be vertical and _____" minimum width. Beds shall be secured with minimum 1.5" thick vinylester grating and either FRP I-beams or box beams permanently bonded to the inside of the vessels. After bonding the supports, the liner shall be built back up to 100 mil minimum over the structural bonds. The beds shall have top access manways for filling and replacing the scrubber media. TETKO Polypro mesh 5-2000/51 or equal shall be used to contain the media and secured 360 degrees to the grating. The manways shall be _____"∅ 150 lb. flange and blind flange complete with EPDM gasket and SS hardware.
10. The scrubber inlet and outlets shall be flanged as shown on the drawings.
11. Domed ends shall be factory attached and constructed to the same liner and structural wall thickness. Chopper gun or hand lay-up methods are acceptable so long as there is no antimony added to the 100 mil liner.
12. Vessel shall be equipped with a 12"∅ FRP sump with a 3/4" drain and ball valve (Optional: when buried below ground level w/sump pump connect to pipe), to be connected to a P-trap supplied by others (utilized in wastewater applications).
13. Vessel will have inserted in each media bed a grounding rod which will have an external means to connect a grounding strap.

2.04 **ACCESSORIES**

A. Media

1. Media beds in the vessel are to be _____-_____for all 4 beds in a 4x1, or in a 4x2 the two inside first pass beds, and _____-_____in the outside second pass beds.
2. Media specs refer to spec section for media.

B. Media installation

1. Media to be installed by contractor on site.
2. Supplied by scrubber manufacturer.

C. FRP duct manifold, fan and stack:

1. FRP duct and stack will be supplied by the carbon vessel supplier per specifications.
2. PVC flex connector with flanges will be supplied to connect fan to vessel.
3. Fan will also be supplied as part of a complete scrubber package, with the Vessel supplier being responsible for the successful supply and start-up of the system. A minimum of 2 days will be required by the vessel supplier at start-up to ensure proper installation and operation. (Fan Specifications will be included based on application.)
4. Epoxy coated steel base saddles will be provided by vessel manufacturer and shall be checked and stamped by a Washington State Structural Engineer to meet structural requirements of seismic zone _____.

(Optional) A Media Life Sampling Probe which allows the external viewing of the remaining life of the carbon media shall be included in each carbon bed.

2.05 **QUALITY ASSURANCE**

A. Pre-bid approval for filament wound FRP scrubbers and related interconnecting materials will be required for all manufacturers listed in the specification. Pre-bid approval will be based on receiving the following acceptable samples and data a minimum of (7) days prior to bid date:

1. (2) sample cutouts demonstrating 60 to 110 mil clear liner with no antimony and filament wound structural laminate. Samples to be a minimum of 8"∅ and RTP-1 visual level II.
2. Company filament winding history and at least (2) FRP carbon scrubber job names with similar type construction, contacts and phone numbers for reference.
3. At least one stamped set of calculations from a previous vessel installation.
4. A copy of the fabricator's complete quality manual.

B. All FRP Vessels shall be fabricated and installed by qualified, experienced mechanics who have a minimum of 3 years experience with the lay-up, fabrication and installation of this type of system.

C. Factory Inspection:

1. Owner shall be given access to the FRP Vessel and all quality control records during fabrication and upon completion for the purpose of verifying compliance to the Contract Documents.
5. The owner shall maintain the right to tour the FRP vessel manufacturer's plant anytime that fabrication is in process prior to final shipment. The owner and engineer may exercise the option, without any advance notice, to tour the plant and inspect all stages of fabrication to ensure that quality control is being maintained.
6. Inspection by owner does not relieve any responsibility of the fabricator to meet the requirements of this specification.
7. Final Inspection: The engineer and owner may carry out a final inspection of the equipment prior to shipment. Fabricator shall give the owner a minimum of 5 days advance notice of scheduled shipment. Prior to final inspection by owner the vessel shall be cleaned of all foreign material and shall be in a position that allows easy access and viewing.

D. Acceptance:

1. Lack of compliance with any aspect of the specifications and drawings will be grounds for rejection of the equipment.
2. Repair of rejected equipment - repair procedures must be approved by the owner prior to implementation. No more than 5% of the surface area of each FRP vessel component may be repaired.

E. The fabricator's inspector (Quality Control Manager) will provide the owner with a complete Quality Control report for the job. The report will be available within 15 days after the final parts are complete. The final report will include the QC sheets on all parts manufactured making it impractical to send prior to the final shipment of a job that will span several months. The fabricator will have available after each shipment the completed QC sheets for review upon request at anytime.

F. The fabricator shall submit a sample of a vessel cutout at least 8" in diameter to demonstrate specification compliance and the ability to produce and maintain ASME RTP-1 Table 6-1 visual acceptance criteria. A plant and fabrication method inspection by an outside testing agency may be required prior to fabrication, or a letter from FSE confirming a satisfactory inspection in the last 6 months. A failed inspection and any subsequent re-inspection will also be at the fabricators expense.

2.06 **SUBMITTALS**

A. Provide the following information in addition to the standard submittal requirements with the Bid:

1. The fabricator shall submit for approval all reference standards, calculations, fabrication drawings and all engineering details of the vessel design prior to beginning fabrication.
    a. The submittal should include all information utilized by the fabricator which describes specifically how their FRP vessels are manufactured. This should be in the form of shop drawings, standards, specifications, other shop instructions and QC records. This should include, but not be limited to:
        1. Resin type
        2. Types and amounts of filler
        3. Corrosion liner description
        4. Reinforcement types for hand lay-up or chopped laminates
        5. For filament-wound laminates:
            a. Helix angle
            b. Glass content range
            c. Strand yield
            d. Strand by inch in the winding band
            e. Ply thickness
            f. Amount of chop or unidirectional roving interspersed with winding, if any, and location within laminate
        6. For all fabricated parts:
            a. Construction type
            b. Laminate thickness
            c. Ply sequences
            d. Glass content range
        7. For all secondary overlays (both interior and exterior):
            a. Laminate thickness
            b. Ply sequences and widths
        8. Construction details for all other special configurations and fabricated parts.

B. FRP vessel cutout a minimum of 8” in diameter and of the quality of workmanship and glass resin being quoted. These will be retained for quality comparison on materials shipped to jobsite.

C. Recommended procedure for the protection and handling of materials prior to installation.

D. Quality control manual detailing shop QC inspection procedures and documentation and samples of all shop QC forms utilized in the process.

2 MEDIA BED UNITS VERTICAL AIRFLOW

For the fiberglass vertical airflow split horizontal media bed units, the maximum number of beds is two, one on top of the other with the air intake between the beds and the air discharge out through the top of the unit. The diameter of both the intake and discharge will be per the engineer's specifications. All media vessels will have a gelcoat covering over the outside and will be provided with a media grounding system. Manways will be provided to access both of the media beds for media installation and removal.

SPLIT BED UNITS WITH 2' DEEP BEDS				
UNITS	**FACE AREA**	**MEDIA FT^3**	**50 FPM**	**75 FPM**
4' dia. vbs	23.3 sq ft	51 cu ft	1,256 cfm	1,885 cfm
6' dia. vbs	56.5 sq ft	113 cu ft	2,827 cfm	4,241 cfm
8' dia. vbs	100.5 sq ft	201 cu ft	5,026cfm	7,539 cfm
10' dia. vbs	157.1 sq ft	315 cu ft	7,854 cfm	11,781 cfm
12' dia. vbs	226.2 sq ft	453 cu ft	11,309 cfm	16,963 cfm
14' dia. vbs	307.8 sq ft	616 cu ft	15,393 cfm	23,089 cfm

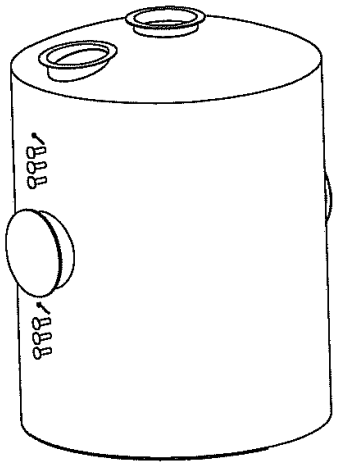
Note: The height of the units will depend on the thickness of the media beds and the diameter and airflow of the unit. The air intake splits the two media beds and air exhaust is out the top of the unit. The split bed units are manufactured with water accumulation drains and with hold-down lugs to secure the unit. The air travels through an internal duct from the lower bed to mix with the upper bed before discharge. This unit will also have grounding rods and sample ports for each bed. The media beds are supported with engineered support poles and a nonmetallic grating with a plastic mesh to keep the media in the correct position. Please contact Spunstrand® Inc. for details of the height of the units.

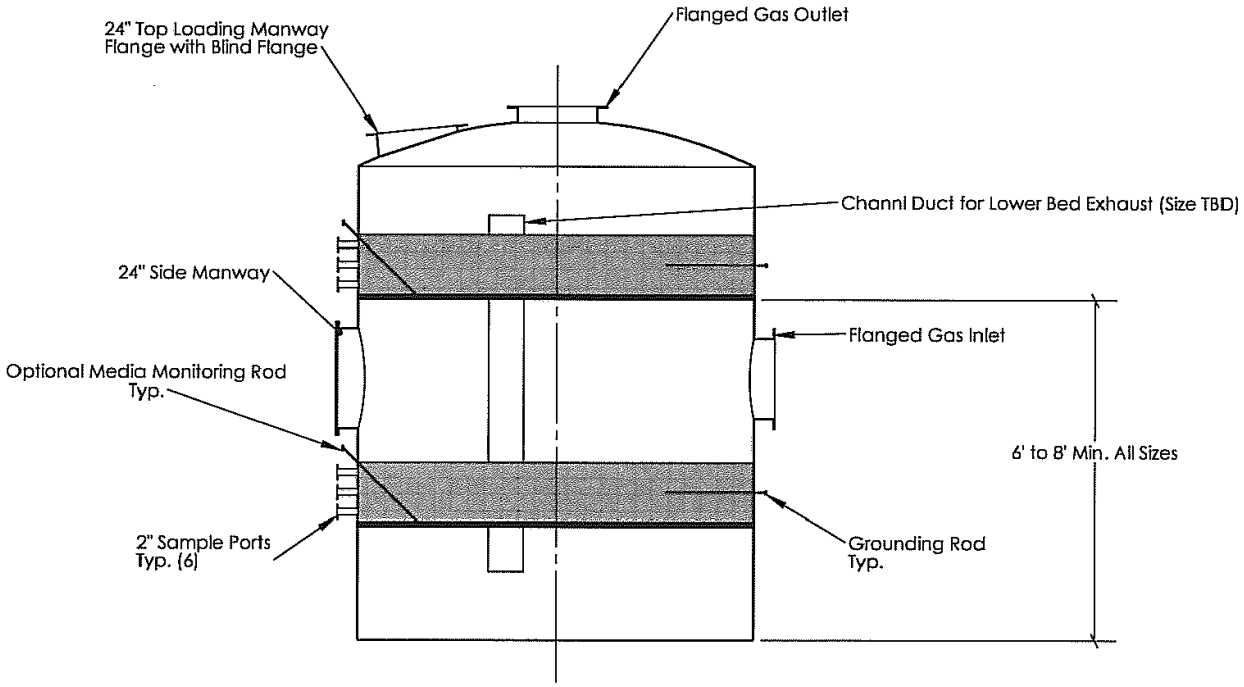
Options:

- Differential Pressure Gauge
- Grounding Rod(s)
- Lifting Lugs
- Extra Media Sample Ports
- MTZ (Mass Transfer Zone) Media-Life Monitoring System
- Double Wall Pre-Insulated Vessel

NOTES:

1. Diameters from 6' to 14';, up to 24' tall single shell.
2. Split bed systems has 2x the flow rate of single bed.
3. Lowest maintenance costs.
4. No pumps or chemicals required.
5. Regenerable media.
6. Optional mass transfer zone monitor (MMR)
7. Media bed depths vary with applications.





		DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ± ANGULAR: MACH ± BEND ± TWO PLACE DECIMAL ± THREE PLACE DECIMAL ±		NAME	DATE
			DRAWN	CJS	2009
			CHECKED		
			ENG APPR.		
			MFG APPR.		
		MATERIAL	Q.A.		
NEXT ASSY	USED ON	FINISH	COMMENTS:		
APPLICATION		DO NOT SCALE DRAWING			

Spunstrand Inc.

Split Bed Carbon Scrubber

SIZE	DWG. NO.	REV.
A	Split Bed	

PROJECT EVALUATION FORM

Company:	Date:
Address:	
Contact:	Title:
Phone:	Fax:
Representative:	Phone:

Which Describes Your Organization? (Check all that apply.)			
	Indoor Air Quality		Water and Soil Remediation
	Wastewater Treatment		Emission Control
	Specialty Carbon Media		Solvent Recovery System
	Bulk Activated Carbon		Potable Water Filtration / Purification
	Containment Filtration		Other

PROCESS CONDITIONS:			
Stream Description (Vapor / Liquid):			
Contamination(s):			
Concentration:			
Operation:	Hrs / Day	Days / Week	Week / Year
Flow Rate: (CFM, GPM, etc.)			
Steam Temperature:		Operating Pressure:	
Are Particles / Suspended Solids Present?		Concentration:	
Ambient RH:		At:	Degrees F:
Request Media Life:			
Other:			

BUDGET and RESTRICTION INFORMATION:
Size Restrictions?
Budget Allotted?
Unit(s) Inside or Outside?
Additional Information:

HETRON® and AROPOL™ Resin Selection Guide

There is a viewable, searchable database version of the Hetron® and

AROPOLTM Resin Selection Guide available online at:

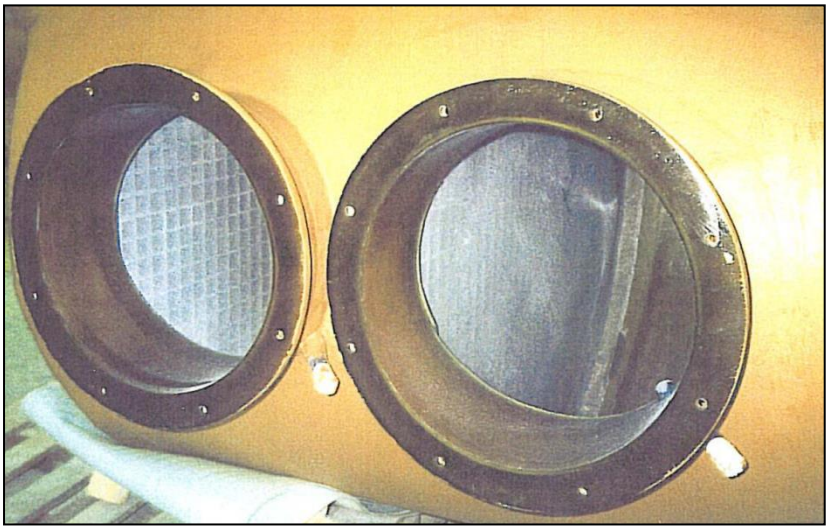
http://www.ashland.com/businesses/apm/cp/corrosion_guide/hetron.asp

MOBILE SCRUBBER SYSTEMS

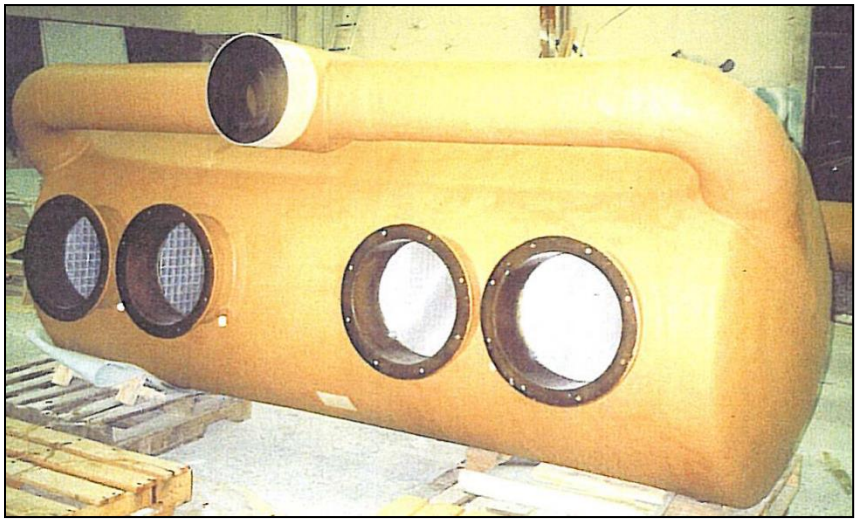
The Spunstrand® Inc. trailer mounted, mobile scrubber system, is a unique approach for a multitude of vapor phase applications. The filament wound Vertical Bed System scrubbers are utilized in primarily two different configurations. A four bed single pass unit for highest CFM capabilities normally operates with one type of media at a time. The other is a four bed two pass unit that can use separate medias in first and second pass. This allows for a wider range of coverage with two medias selected for the contaminates. A two bed single pass unit with larger beds is also available.

The vessel can be driven right to the source of an odor or chemical discharge, and put into use with the flip of a switch. A flex hose and cone adapter can cover a manhole, or be secured to a wet well or pump station vent for immediate odor control. Chemical collection during a tank venting process also sets up well for the mobile scrubber system.

Standard trailers are available in 800 to 15,000 CFM units. Vessel orientation and media selections are custom tailored to each application. Complete specifications are available upon request.



Looking in through the media bed access flanges, the polypro mesh and 1.5” vinylester grating can be seen. Also shown are the 1” threaded PVC dipstick nozzles installed at an angle. This allows the dipstick to monitor the mass transfer zone in the media bed, as well as eliminating the need for a series of 3 sample probes. This vertical bed scubber has 4 dipsticks rather than 12 sample probes. The polypro mesh is held in place with removable FRP retaining rings, should the mesh ever need to be replaced.



Standard Spunstrand® Inc. options include integral duct manifolds and stack assemblies. The tangent outlets provide the best airflow with the closest possible profile. The doomed end caps increase the area of the exhaust plenum and provide greater strength in partial or complete burial applications. The unit shown above is gelcoated a brown color as selected by the owner. This unit is installed indoors at a pump station where there is very little space available and the compact design allows for a proper fit.